DOCUMENT RESUME

ED 219 401 TM 820 407

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TITLE A Twelve-Year Follow-Up Study of the Relationship Between Academic Achievement and the Results of a Screening Battery Administered at School Entry.
PUB DATE Mar 82
NOTE 26p.; Paper presented at the Annual Meeting of the American Educational Research Association (66th, New York, NY, March 19-23, 1982).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; Birth Order; *Educational Attainment; Educational Testing; Elementary Secondary Education; Family Influence; *Followup Studies; Identification; Multiple Regression Analysis; *Performance Factors; *Predictor Variables; Screening Tests; Sex Differences; Student Evaluation
IDENTIFIERS Mid Primary Screening Battery

ABSTRACT

Performance on the Mid-Primary Screening Battery (MPS) at the time of school-entry was found to be related to a student's eventual level of academic success in high school. Other related variables identified in a multiple regression analysis include the years of education of the father, the sex of the student, the years participating in the Mentally Gifted Minors Program, family integrity and birth order. Students' grade point average and rank in class as high school students were compared to their MPS classification as either educationally vulnerable, average, capable/vulnerable or capable. Students who had been identified as capable were found to demonstrate a higher composite of academic achievement than students in the other categories. (Author/CM)

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ED219401

A TWELVE-YEAR FOLLOW-UP STUDY OF THE RELATIONSHIP BETWEEN ACADEMIC ACHIEVEMENT AND THE RESULTS OF A SCREENING BATTERY ADMINISTERED AT SCHOOL ENTRY

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TM 820 907

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Abstract

The grade point average and rank in class of high school students who had been identified as either educationally vulnerable, average, capable/vulnerable, or capable at entry into school were compared. Students who had been identified as capable were found to demonstrate a higher composite of academic achievement twelve years later than the students in the other three classifications.

Also, multiple regression analysis identified the following variables which are related to a student's eventual level of academic success in high school: years of education of the father, the sex of the pupil, the results of the Mid-Primary Screening Battery (MPS) (Oyler, 1968), years in the mentally gifted minor program, family integrity, and birth order.

A TWELVE-YEAR FOLLOW-UP STUDY OF THE RELATIONSHIP BETWEEN ACADEMIC ACHIEVEMENT AND THE RESULTS OF A SCREENING BATTERY ADMINISTERED AT SCHOOL ENTRY

A key concern in educational psychology is early evaluation of school performance to determine the special needs or strengths, talents or gifts each child has, with the ultimate goal being to optimize school success. Concomitant with this key concern is learning which factors most affect learning performance over the years.

A large number of studies have reported that a pattern of school success is established early during the child's preschool years (Bloom, 1964; 1981; Kohlberg, 1968; Bartlett, 1977; Ausubel, 1963; Gesell, 1945; Piaget, 1939; Sarason, et. al., 1960; Coleman, 1966; Bronfenbrenner, 1974). Also, various patterns of home environment, family integrity, family configuration, father's and mother's education and occupations, and demographic variables which correlate with school performance have been studied closely (Dave, 1963; Hanson, 1975; Zajonc, 1976; Simpson, 1966; Saurenman, 1975; Marjoribanks, 1978; 1979; Nutall, et. al., 1976).

In their four-year longitudinal research, Stevenson, et. al. (1976), utilized psychometric tasks to predict achievement in the early elementary grades; however, they and others (Myklebust, 1971; Ilg, Ames, and Apell, 1965; Ferinden, Jacobson and Linden, 1970) tended to rely more heavily on the predictive value of teachers' ratings in contrast to psychometric measurements.

Development of methods of early assessment and appropriate interventions, before the child experienced school failure, has been the focus of several researchers in this area (de Hirsch, et. al., 1966; Satz and Friel, 1974; Satz and Ross, 1973; Keough and Smith, 1970; Feshbach, Adelman and Fuller, 1977). While this interest continued into the present, Adelman and Feshbach (1975) and other investigators (Luby, 1980;

Wickman, 1928), call for caution in the early identification or "labeling" of children.

Diverse opinions have resulted from the research about the effectiveness of short and long term school intervention programs for children who were identified as having either low or high ability (Luby, 1980; Saurenman, 1975; Yaggie, 1972; Buerger, 1968; Spache, 1962).

Different opinions were also expressed concerning the use of grade point average (GPA) or rank in class as criteria in assessing academic success (Bloom, 1964; Elton, 1966; Roth, Meyersburg and Arnold, 1963).

Other factors affecting academic success have also been the focus of many studies, such as sex differences and the effects of chronological age (Finlinson, 1978), intact versus divorced families (Hammond, 1979), single parenthood (Leo, 1982), race and socio-economic status (Stauffer and Hinzman, 1980), ethnicity (Marjoribanks, 1978), test anxiety (Sarason, et. al., 1964; Feldhausen and Klausmeier, 1962; Zimbardo and Berkowitz, 1963, self-concept (Gass, 1975; Hoffer, 1975), residential mobility (Benson, et. al., 1979), motivation for learning (Bloom, 1981; Stein and Bailey, 1973), peer status (Horne, et. al., 1978), school attitude (Combs, 1977; Marjoribanks, 1978), test behavior, attention and energy for task (Meyers et. al., 1968; Gaver and Richards, 1977), vocational aspirations (Smith, 1979), affective indicators (Kohn and Rosman, 1973; Pusser and McCandless, 1974), lateralization (Belmont, et. al., 1965; Satz, et. al., 1974; Kershner, 1978), school dropouts (Sappington, 1979; Lerner, 1976; Crew, 1976) the aspirations and expectations of parents (Alexander, 1975), visual-perceptual-motor and language development (Swanson, 1979; Dawson, 1969; Keogh and Smith, 1970).

The objective of this study was to examine the relationship between student performance on the Mid-Primary Screening Battery (Oyler, 1968)

and academic achievement twelve years later.

Method

Sample

Three hundred twenty-four high school students from a southern California school district who had been administered the Mid-Primary Screening Battery (Oyler, 1968) twelve years previously were the subjects of this research. Descriptive indices related to the characteristics of the students are displayed in Tables 1-4. Based on the results of the Mid-Primary Battery (MPS), the students were identified as either educationally "vulnerable," "average," "capable/vulnerable," or "capable."

Instrument

The Mid-Primary Screening Battery (Oyler, 1968) which was administered to each of the subjects in this study assesses nine factors. The nine factors and the associated subtests are presented in figure 1. The MPS requires approximately seventy minutes to administer. There are no timed tasks.

Procedures

In the years 1979 and 1980, a search was made of the records of the 603 students who were administered the MPS during the school years 1967-68 and 1968-69. Search of cumulative records, graduation lists, list of students who left the district, inactive files, microfilm retrieval, class photographs, telephone calls to parents, conferences with school staff, home visits, and parent conferences were employed to gather information. Of the 603 students who had been screened in the first grade, information about all of them except sixteen was available. Two hundred sixty-three students had left the district before entering grade eleven. Only the data including grade point average and rank in class for the three hundred twenty-four students who remained in the district was utilized in this study.

TABLE 1

Sex	SEX MPS Category Vulnerable No.	Percent	Average No.	Percent	Capable/ Vulnerable No.	Percent	Capable No.	Percent
Male	45	58%	46	50%	30	62%	47	44%
Female	32	21%	47	50%	18	38%	59	56%
Totals	77	100%	93	100%	48	100%	106	100%

TABLE 2

YEARS OF EDUCATION OF FATHER

Years Of Education	MPS Category							
	Vulnerable		Average		Capable/ Vulnerable		Capable	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
0-8	3	4%	0	-	0	-	0	-
9-12	16	22%	11	12%	5	10%	4	4%
13-16	29	38%	47	51%	22	46%	48	45%
17+	29	38%	35	38%	21	44%	54	51%
Totals	77	100%	93	100%	48	100%	106	100%
Mean	15.20		15.79		16.60		17.22	
Standard Deviation	3.79		2.68		3.13		2.67	

TABLE 3

BIRTH ORDER

Birth Order	MPS Category							
	Vulnerable		Average		Capable/ Vulnerable		Capable	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
1	21	27%	18	19%	14	29%	27	26%
2	14	18%	28	30%	12	25%	33	31%
3	23	30%	26	28%	9	19%	26	24%
4	10	13%	14	15%	6	13%	11	10%
5	8	11%	5	6%	2	4%	5	5%
6	1	1%	2	2%	4	8%	2	2%
7	0	-	0	-	1	2%	1	1%
8	0	-	0	-	0	-	1	1%
Totals	77	100%	93	100%	48	100%	106	100%
Mean	2.65		2.63		2.71		2.52	
Standard Deviation	1.36		1.23		1.67		1.40	

TABLE 4

PARENTS MARITAL STATUS

Marital Status	MPS Category							
	Vulnerable		Average		Capable/ Vulnerable		Capable	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
None	1	1%	0	-	0	-	0	-
Divorced, Separated, Deceased	12	16%	8	9%	5	10%	6	6%
United	64	83%	85	91%	43	90%	100	94%
Totals	77	100%	93	100%	48	100%	106	100%
Mean	1.82		1.91		1.90		1.94	
Standard Deviation	.42		.28		.31		.23	

Figure 1

Mid-Primary Screening Battery

Factors	Subtests
1. Figural Reasoning	Raven's Progressive Matrices
2. Immediate Memory	WISC Digit Forward WISC Digit Backward
3. Self In Space	Self Awareness: left-right Others Awareness: left-right Object Awareness: left-right Geographic Orientation Hand Preference Eye Preference
4. Risk Taking and Problem Solving	Westcott Total Guesses
5. Social Evaluation	Student Self-Concept Self Correction Authority Approach Space Conservation
6. Cognitive Clarity	Days of Week Temporal Concepts Classification
7. Ideational Fluency	Fluency in Classification Temporal Concepts Amount of Energy Direction of Energy
8. Adult Judgment	Child's Attention Eye Tracking Scanning Following Directions Relatedness of Ideas Richness of Expression
9. Vocabulary	WISC Vocabulary

Analysis and Results

First, the data were analyzed using a one-way unweighted means multivariate analysis of variance (MANOVA) (Carroll, 1975) for the indentification of a composite of the two dependent variables (grade point average and rank in class) which maximized the difference between the four groups of students who had been identified by the MPS either to be "vulnerable," "average," "capable/vulnerable," or "capable." The components evaluated using this procedure were the effects of the four levels of the independent variable. Each component was associated with effect and error matrices that produced a maximizing linear composite of dependent variables. The magnitude of variation in mean composite scores associated with effect was compared to chance fluctuation using greatest characteristic root (GCR θ) (Harris, 1975) and Wilks' Lambda (Morrison, 1963) criteria. Table 5 displays the mean GPA and rank in class for each of the four groups of students.

The mean composite scores of the four groups of students were different (GCR θ = .1595, s = 2, m = .0, n = 158.5, $p < .00001$; Wilks' Lambda = .8198, F = 11.11, df = 3/320, $p < .00001$). The composite associated with the difference between the groups of students was (5* Rank in Class + GPA).

Roy and Bose (1953) multiple comparisons were performed to identify pair wise group differences in the mean composite of GPA and Rank in Class. The mean composites of the vulnerable and average students were not different beyond chance expectation. Also, the mean composites of the vulnerable and capable/vulnerable groups were not different beyond chance expectation. The capable students had a lower mean composite of GPA and Rank in Class than the students classified as vulnerable (GCR θ = .1473, s = 2, m = .0, n = 158.5, $p < .0001$). The capable/vulnerable students had a lower mean composite of GPA and Rank in Class than the average students

Table 5

MEANS AND STANDARD DEVIATIONS:

VULNERABLE, AVERAGE, CAPABLE/VULNERABLE, AND CAPABLE STUDENTS

MID-PRIMARY SCREENING CATEGORY	GPA 12 YEARS LATER[1]		RANK IN CLASS 12 YEARS LATER	
	Mean	Standard Deviation	Mean	Standard Deviation
Vulnerable (N=77)	2.37	.71	297.38	122.33
Average (N=93)	2.54	.82	254.83	141.36
Capable/ Vulnerable (N=48)	2.62	.67	252.56	118.29
Capable (N=106)	3.20	.64	142.93	118.70

[1](GPA: 4 = A, 3 = B, 2 = C, 1 = D, F = 0)

(GCR θ = .00037, s = 2, m = .0, n = 158.5, $p < .01$). The capable students had a lower mean composite of GPA and Rank in Class than the capable/vulnerable students (GCR θ - .0801, s = 2, m = .0, n = 158.5, $p < .0001$). Finally, the capable students had a lower mean composite of GPA and Rank in Class than the average students (GCR θ = .0831, s = 2, m = .0, n = 158.5, $p < .0001$).

Univariate analyses using GCR F_{crit} indices (Harris, 1975) were conducted. The capable students had a higher mean GPA than the vulnerable group (GCR θ = .1341, s = 2, m = .01, n = 158.5, $p < .0001$). The capable students had a higher mean GPA than the average students (GCR θ = .0894, s = 2, m = .01, n = 158.5, $p < .0001$). The capable students had a higher mean GPA than the capable/vulnerable students (GCR θ = .0691, s = 2, m = .0, n = 158.5, $p < .0002$). The capable students had a higher mean rank in class than the vulnerable students (GCR θ = .1473, s = 2, m = .0, n = 158.5, $p < .0001$). The capable/vulnerable students had a higher mean rank in class than the average students (GCR θ = .000037, s = 2, m = .01, n = 158.5, $p < .01$). The capable students had a higher mean rank in class than the average students (GCR θ = .0831, s = 2, m = .0, n = 158.5, $p < .0001$). The capable students had a higher mean rank in class than the capable/vulnerable students (GCR θ = .0801, s = 2, m = .0, n = 158.5, $p < .0001$). The vulnerable and average students did not have mean GPA's which differed beyond chance expectation. Also, the vulnerable and capable/vulnerable students did not have mean GPA's which were different beyond chance expectation. Nor were the mean GPA's of the average and capable/vulnerable different beyond chance. The rank in class of the vulnerable and average students were not different. The mean rank in class of the vulnerable and capable/vulnerable students were not different.

Second, multiple regression was employed for the analysis of the composite of the following factors: Mid-Primary Screening (MPS) Categories, Years of Education of the Father, Occupational Level of the Father, Years of Education of the Mother, Occupational Level of the Mother, Number of Siblings, Birth Order, Family Integrity, Ethnicity, Age at Time of the MPS, Years in the Educationally Handicapped Program, Years in the Learning Disability Group Program, Years in Speech Therapy, Years in the Miller-Unruh Reading Program, Years in the Mentally Gifted Minor Program, Sex, and Years of Preschool which provided maximum relationship with students' grade point average approximately twelve years later. Means and standard deviations for the variables examined in this part of the study are contained in Table 6. Correlations among the variables are displayed in Table 7.

Darlington's (1968) usefulness criteria were used in a stepdown procedure for the identification of the variables that contribute to the composite's relationship with the students' grade point average during the last year of high school. The stepdown procedure identified the composite of Mid-Primary Screening Categories (1 = Vulnerable, 2 = Average, 3 = Vulnerable/Capable, or 4 = Capable), Years of Education of the Father, Birth Order, Family Integrity (2 = United, 1 = Divorced, separated, or deceased), Years in the Mentally Gifted Minor Program, and Sex (1 = Male, 2 = Female) as the most parsimonious composite related to the students' grade point average twelve years after the Mid-Primary Screening Battery.

Variation in composite scores was found to account for 36 percent of the variation in the students' grade point average (GPA). Table 8 displays the composite weights, in raw and standardized form, and the Darlington's (1968) usefulness values.

Table 6

MEANS AND STANDARD DEVIATIONS

		MEAN	STANDARD DEVIATION
1.	MPS CATEGORY	2.5648	1.1746
2.	GPA	2.7243	0.7907
3.	RANK IN CLASS	227.9969	140.1692
4.	YRS ED OF FATHER	16.2346	3.1339
5.	OCCUP LEVEL FATHER	4.5432	0.8519
6.	YRS ED OF MOTHER	14.5710	2.5275
7.	OCCUP LEVEL MOTHER	4.1728	0.9249
8.	NO OF SIBLINGS	2.3148	1.4867
9.	BIRTH ORDER	2.6111	1.3821
10.	FAMILY INTEGRITY	1.8981	0.3130
11.	ETHNICITY	1.8735	0.3421
12.	AGE TIME OF MPS	80.2407	4.5120
13.	YRS IN EH	0.1420	0.7286
14.	YRS IN LDG	0.5000	1.3296
15.	YRS IN SP THERAPY	0.9414	2.0337
16.	YRS IN MIL-UNRUH	0.1759	0.6018
17.	YRS IN MGM	1.9383	2.1541
18.	SEX	1.4815	0.5004
19.	YRS OF PRESCHOOL	0.5772	0.7771

Table 7

CORRELATION AMONG THE VARIABLES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. MPS Category		.41	-.42	.26	.26	.28	.20	-.05	-.03	.13	.16	.02	-.20	-.15	-.13	-.16	.50	.08	.03
2. Grade Point Average			-.98	.39	.36	.36	.33	-.13	-.17	.19	.24	.01	-.21	-.17	-.07	-.10	.39	.23	.13
3. Rank In Class				-.36	-.33	-.34	-.32	.12	.15	.15	-.19	.17	.21	.17	.08	.12	-.37	-.22	-.12
4. Father's Education					.71	.72	.56	-.09	-.07	.07	.39	-.02	-.20	.05	.01	-.13	.31	-.06	.13
5. Father's Occupation						.58	.56	-.15	-.13	.10	.42	.04	-.33	-.03	-.05	-.19	.26	.00	.09
6. Mother's Education							.67	-.06	-.08	.09	.35	-.03	-.13	.00	-.11	-.12	.30	.01	.14
7. Mother's Occupation								-.13	-.15	.03	.27	.03	-.14	-.00	-.15	-.20	.26	-.03	.02
8. Number of Siblings									.81	.07	-.07	.05	.08	.11	-.00	.13	.01	-.06	.03
9. Birth Order										.04	-.06	.01	.11	.13	.04	.13	-.03	-.08	-.00
10. Family Integrity											.11	-.09	.01	-.10	.02	-.02	-.00	.04	.06
11. Ethnicity												.08	-.19	-.04	-.07	-.10	.15	.03	.08
12. Age at Time of MPS													.01	-.01	-.01	.04	.02	-.06	.13
13. Years in EH														.09	.13	.30	-.16	-.15	-.02
14. Years in LDG															.13	.23	-.02	-.26	-.06
15. Years in SP/LANG																.06	-.10	-.14	-.02
16. Years in Miller-Unruh																	-.08	-.01	.03
17. Years in MGM																		.02	.03
18. Sex																			.02
19. Years of Preschool																			

Table 8

RESULTS OF THE STEPDOWN REGRESSION ANALYSIS ON STUDENTS' GRADE POINT AVERAGE TWELVE YEARS AFTER THE MID-PRIMARY SCREENING BATTERY

Variables	Composite Weights Raw (B)	Standardized (P)	Darlington's Usefulness	F	df	p
Years of Education of the Father	.28	.07	.07	32.38	1/317	.001
Sex	.21	.33	.05	22.40	1/317	.001
MPS Categories	.21	.14	.03	14.37	1/317	.001
Years in the Mentally Gifted Minor Program	.19	.07	.03	13.90	1/317	.001
Family Integrity	.14	.35	.02	9.19	1/317	.005
Birth Order	-.12	-.07	.02	7.75	1/317	.01
(Constant)	.14					

$R^2 = .3618$

The students who tended to have high grade point averages approximately twelve years after the Mid-Primary Screening Battery (MPS) were the pupils whose fathers had an above average number of years of education, who were female, were identified as vulnerable/capable or capable by the MPS, were members of a united family at the time of the MPS, participated in the Mentally Gifted Minors Program, and generally were the first or second child in their family. On the other hand, the students who had low GPA's twelve years later were the pupils whose fathers had a below average number of years of education, were male, were identified as either vulnerable or average by the MPS, were not identified for participation in the Mentally Gifted Minors Program, were members of a single parent family, and were the third or later born child in the family.

Discussion

The major finding of this study was the identification of a composite of variables at the time of school entry which are related to a student's eventual level of academic success or failure later in high school. The variables included: years of education of the father, the sex of the pupil, the results of the Mid-Primary Screening Battery (MPS) (Oyler, 1968), years in the mentally gifted minor program, family integrity, and birth order. The finding provides some initial validity for the use of the MPS at the time of entry into first grade along with other family information to identify students whose later success in school may be at risk.

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